IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

AMPEX CORPORATION, *Plaintiff,* v. EASTMAN KODAK COMPANY, ALTEK CORPORATION, and CHINON INDUSTRIES, INC., *Defendants.*	)	C.A. No. 04-1373 (KAJ)

DECLARATION OF DR. GEORGE T. LIGLER IN SUPPORT OF AMPEX CORPORATION'S CLAIM CONSTRUCTION BRIEF

OF COUNSEL:
Jesse J. Jenner
Sasha G. Rao
Ropes & Gray LLP
1251 Avenue of the Americas
New York, NY 10020
(212) 596-9000

Norman H. Beamer
Gabrielle E. Higgins
Ropes & Gray LLP
525 University Avenue
Palo Alto, CA 94301
(650) 617-4000

James E. Hopenfeld
Ropes & Gray LLP
One Metro Center
700 12th Street, NW
Washington, DC 20005
(202) 508-4600

MORRIS NICHOLS ARSHT & TUNNELL LLP
Jack B. Blumenfeld (#1014)
Julie Heaney (#3052)
1201 North Market Street
P.O. Box 1347
Wilmington, DE 19899-1347
(302) 658-9200
jblumenfeld@mnat.com
jheaney@mnat.com
Attorneys for Plaintiff Ampex Corporation

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DECLARATION OF DR. GEORGE T. LIGLER

I, GEORGE T. LIGLER, declare as follows:

I. INTRODUCTION

1. I understand that this Declaration is being submitted in conjunction with Plaintiff Ampex Corporation's Claim Construction Brief. Unless specifically indicated otherwise, this Declaration is made based on personal knowledge.

2. I am self-employed as the sole proprietor of GTL Associates.

3. I provide consulting services primarily related to systems engineering of computer systems, both hardware and software, and telecommunication systems.

4. I have worked with 35 clients in the United States and Europe, including assignments at both the national and international levels on computer system standards for aviation at the request of the Federal Aviation Administration.

5. Attached as **Exhibit 1** is a true and correct copy of my resume.

6. I have been retained by the Ropes & Gray law firm on behalf of Ampex Corporation as a consultant and expert witness in this action.

7. Under my consulting engagement with Ropes & Gray, I have been compensated at a rate of $400 per hour, plus reimbursement for expenses. I will receive no other compensation for my work in this case.

8. I am the same George T. Ligler who submitted in this case (1) the Initial Disclosure of Expert Testimony of Dr. George T. Ligler, dated March 24, 2006; and (2) the Disclosure of Expert Rebuttal Testimony of Dr. George T. Ligler, dated April 24, 2006.

9. I previously was retained in connection with the ITC Investigation (*In the Matter of Certain Digital Image Storage And Retrieval Devices*, Investigation No. 337-TA-527).

10. I am the same George T. Ligler who submitted in the ITC Investigation (1) the Initial Expert Report of Dr. George T. Ligler, dated March 25, 2005; (2) the Supplemental Expert Report of Dr. George T. Ligler, dated May 27, 2005; (3) the Rebuttal Expert Report of Dr. George T. Ligler, dated May 11, 2005; (4) the Direct Testimony of Dr. George T. Ligler, dated July 15, 2005; and (5) the Rebuttal Testimony of Dr. George T. Ligler, dated July 28, 2005.

II. FIELD OF THE '121 PATENT; PERSON OF ORDINARY SKILL IN THE ART

11. I have reviewed the '121 patent, its prosecution history, and the references cited on the face of the '121 patent. Further, I have reviewed art that I understand Kodak and Altek's experts may rely upon in assessing the validity of the '121

patent, as well as further publications that inform me about the state of the art of the '121 patent in April 1983.

A. Field of the '121 Patent

12. I have developed an opinion as to the art pertinent to the subject matter of the '121 patent: the art of digital image processing and digital television broadcasting equipment.

13. In my opinion, the art pertinent to the subject matter of the '121 patent is not limited to technology for broadcast television. This opinion is confirmed by prior art cited by the Examiner during the prosecution of the '121 patent.

14. Attached as **Exhibit 2** (EKC000142599-606) is a copy of U.S. Patent No. 4,152,722 to Inuiya, which was included in the list of References Cited on the face of the '121 patent. The Inuiya reference was cited by the Examiner in the December 21, 1984 Office Action (Paper 3 of the prosecution history of the '121 patent), at the same time that he cited the Boyd article describing the Quantel DLS 6000 digital still store library system.

15. The Inuiya reference discloses a graphic information retrieval system that accepts input from a "super-microfiche retrieval unit" (Exh. 2, column 1, lines 9-14; column 2, lines 40-44) and provides output to an attached television-type display device.

16. Attached as **Exhibit 3** (AX098022-57) is a copy of European Patent Application Number 0 051 305 A1 (including a European Search Report) with inventor Kazuhiko Yamamoto, which was included in the list of References Cited on the face of the '121 patent. The Yamamoto reference was cited by the Examiner in the

September 3, 1985 Office Action (Paper 11), as an example of a "storage system which can store a variable amount of picture information" (Paper 11, p. 6).

17. The Yamamoto reference discloses a "picture information file device" for storing and retrieving a document picture (Exh. 3, AX098024 at lines 6-13) that accepts input from a two-dimension scanning device and provides output either to a display device or to a printer.

18. In my view, a person reading these references in 1983 would understand that neither disclosure describes a broadcast television (sub)system. Therefore, these references from the prosecution history of the '121 patent support my opinion that the art pertinent to the subject matter of the '121 patent is not limited to technology for broadcast television.

B. Person of Ordinary Skill in the Art

19. The original application that led to the '121 patent was filed on April 8, 1983.

20. I have personal knowledge that assists in understanding the level of skill in the art to which the '121 patent pertains on or around April 1983. On April 8, 1983, I was the President of the Aydin Controls Division of the Aydin Corporation. The Aydin Controls Division designed, manufactured and sold digital graphics products such as high-resolution color raster scan monitors and color graphics display generators. A sister division of Aydin Controls, called Aydin Computer Systems, integrated products of Aydin Controls into computer systems and developed subsystems such as "frame grabbers," which captured still video images. Further, by 1983 I had seven years of post-

doctoral experience in the design and implementation of computer systems, both hardware and software.

21. In my opinion, a person of ordinary skill in the art of the '121 patent as of April 1983 was typically a person with a bachelor's degree in electrical engineering or computer science, and at least 3-4 years of design experience in the field. Alternatively, such a person of ordinary skill would have had a master's degree in electrical engineering or computer science and at least 1-2 years of design experience in the field.

22. I base my opinion on my review of the '121 patent, and on my direct knowledge of the level of skill of a large number of engineers in the field in 1983.

23. In April 1983, I was a person of at least ordinary skill in the art to which the '121 patent pertains.

III. UNDERSTANDING BY ONE OF ORDINARY SKILL IN THE ART OF CERTAIN CLAIM TERMS

24. I have been informed that claim construction is a matter of law.

25. I have been asked to provide my technical understanding of several terms used in the asserted claims of the '121 patent (Claims 7-8 and 10-15) and to explain how those terms would be understood by a person of ordinary skill in the art.

26. More specifically, I have been asked what a person of ordinary skill in the art of the '121 patent, as of April 8, 1983, would understand the following terms, used in one or more of asserted claims 7-8 and 10-15, to mean:

(a) "video" as in "video image(s)" or "video pixel data" in claims 7, 8, 10, 11, 13, 14, and 15, and as in "video still store" in claim 12;

(b) "said video pixel data" in claim 7, "the video pixel data" in claims 8 and 14, "the video data" in claim 10, "said full size image data sets" in claim 12, and "the data sets of the plurality of full size images" in claims 13 and 15;

(c) "direct" and "directly" in claims 7, 8 and 10;

(d) "selectively generating" in claim 7;

(e) "input port" and "output port" in claims 8 and 14; and

(f) "accessing … simultaneously" in claims 13 and 15.

27. In my view, the claim constructions proposed for these terms by Ampex are consistent with what a person of ordinary skill in the art of the '121 patent would understand the terms to mean, assuming that person reviewed the claims, specification, drawing, prosecution history, and cited references of the '121 patent.

28. Additionally, I have been asked to identify the function and structure of certain claim elements which I am informed are subject to means-plus-function analysis.

A. "Video"

29. The term "video" is used in "video image(s)" or "video pixel data" in claims 7, 8, 10, 11, 13, 14, and 15, and is used in "video still store" in claim 12.

30. I understand that Ampex proposes the following definition of "video image":

> "Video image" means an electronic signal representation of visual information displayable in visual form on a monitor or other display device. Generally, a video image may represent a still image or a moving image. The video images referred to in the '121 claims are still video images.

31. In my opinion, this construction is consistent with what a person of ordinary skill in the art of the '121 patent would understand the term "video image" to mean, as of April 8, 1983. Although the term "video" is a broad term that has a variety of different meanings in different contexts, Ampex's construction is sound in the context of the '121 patent.

32. I also understand that Ampex proposes the following definitions of "video pixel data" and "video data":

> "Video pixel data" (claims 7, 8, 11, 13, 14, 15) means data representing picture elements ("pixels") of a video image. "Video data" (claim 10) means video pixel data or other data representing a video image.

33. These constructions are also consistent with what a person of ordinary skill in the art of the '121 patent would understand these terms to mean, as of April 8, 1983.

34. I further understand that Ampex proposes the following definition of "video still store":

> "Video still store" (claim 12) means a system capable of storing still video images.

35. This construction is also consistent with what a person of ordinary skill in the art of the '121 patent would understand the term "video still store" to mean, as of April 8, 1983, although some of skill in the art might additionally attach a speed of operation requirement to the definition.

36. The bases for my opinions concerning what a person of ordinary skill in the art of the '121 patent would understand "video image," "video pixel data," and "video still store" to mean start with my direct experience in the art.

37. Moreover, I and others used the term in discussing computer graphics and various display technologies in this time period.

38. In addition, I have reviewed a number of documents from the 1980s that support my opinion. These documents, among other things, confirm that the use of the term "video" in 1983 was not limited to discussions of then-current broadcast television standards.

39. As background, NTSC and PAL were the most widely-used broadcast television standards to transmit TV pictures in 1983.

40. NTSC is a format developed by the National Television System Committee, and is a specific broadcast television standard that was commonly used in North America in 1983. The term NTSC is used in the '121 patent, which, for example, in column 3, lines 57-58 states: "out of a 525 line NTSC frame of data only about 484 lines represent video data."

41. PAL, short for Phase Alternating Line, is the dominant broadcast television standard in Europe today and was so in 1983 as well.

42. Attached as **Exhibit 4** (AX209669-72) is a copy of an article describing discussions that took place in 1981-1982 about the possibility of higher definition television standards that might ultimately supplant, at least in part, then-current standards such as NTSC.

43. In my opinion, this article demonstrates that, as of 1983, other broadcast television standards were being discussed that would use even higher resolutions than NTSC and PAL, yet those new standards were still referred to as video.

44. Attached as **Exhibit 5** (AX204815-25) is a copy of EIA Standard RS-343-A, dated September 1969, which defines electrical performance standards for a "High Resolution Monochrome Closed Circuit Television Camera."

45. The signal parameters for closed-circuit television, as defined in this document, are quite different from those in NTSC or PAL, but the output of the system is nonetheless identified as "video" on page 1 of the document (Exh. 5, AX204817). Moreover, the standard applies only to locally-generated signals as opposed to standard TV broadcast signals.

46. In addition, the term "video" was used outside the television broadcast industry. By 1983, the computer graphics industry was flourishing, and the graphical display capabilities of computer systems were expanding rapidly. The term "video" was used broadly across industry lines.

47. Attached as **Exhibit 6** (AX103689-705, AX103778-96, AX104116-22) are excerpts from a copy of an IBM PC July 1982 Reference Manual.

48. On pages 2-49 and 2-50 (Exh. 6, AX103778-79), this manual describes a Color/Graphics Monitor Adapter, which provided an interface to display terminals for the IBM PC. This interface, which became a *de facto* computer graphics standard, specified an active pixel area of either 320 x 200 or 640 x 200 pixels. The interface was further described as supplying "video."

49. Turning to the glossary accompanying this manual, the term "video" is defined as: "Computer data shown or displayed on a cathode ray tube monitor or display" (Exh. 6, AX104122). This definition illustrates that one of ordinary skill in the art would understand that "video" was not limited to particular broadcast TV

standards, such as NTSC or PAL, but more broadly encompassed computer data suitable for display on a display device.

50. This definition is also consistent with the definition that was used at the Aydin Controls Division during my tenure there in 1982-84.

51. Attached as **Exhibit 7** (AX209805-969) is a copy of a June 1981 User's Manual for Standard Firmware for the Aydin 5216 display computer.

52. Page 1-2 of the Manual describes video display cards for displaying computer data on a display device (Exh. 7, AX209813). The 5216 display computer was frequently used in computer systems that did not contain television cameras or broadcast television signals. This manual uses the term "video" in a manner consistent with my direct experience at Aydin Controls as well as my discussions, particularly in the 1982 to 1984 time frame, with others working in the field.

53. Attached as **Exhibit 8** (AX209970-78, AX210025-26) are excerpts from a copy of a September 1982 Hardware Reference Manual for the Ramtek RM-9460 Graphic Display System.

54. Ramtek Corporation was one of Aydin Controls' competitors in several markets. As with the Aydin 5216 display computer, the RM-9460 contained a "video 7 PCB" where PCB signifies a Printed Circuit Board. On page 4-15 of the Manual, Ramtek states that "[t]he video 7 PCB accepts digital video data from the 10 x 12 memory PCB and outputs analog RGB signals to a video monitor" (Exh. 8, AX210025). Again, such use of the term "video" is consistent with the IBM and Aydin Controls usage of the term.

55. Attached as **Exhibit 9** (AX205079-100, AX205177-95, AX205425-28) are excerpts from a copy of a manual for the VT-100 Video Terminal, dated 1982.

56. This manual shows that, prior to 1983, Digital Equipment Corporation sold a series of display terminals that were called "video terminals" and that accepted signal formats that were not used in standard broadcast television. The display formats included 768 x 256 pixels and 1188 x 240 pixels (Exh. 9, AX205427, AX205186). The VT 100 display terminals would typically display alphanumeric text (Exh. 9, AX 205098).

57. Attached as **Exhibit 10** (AX204939-45) is a copy of an article entitled "Digital Paint Systems," dated April 1982.

58. This article summarizes various parameters of the display terminals used with digital paint systems in the 1982 time frame. Digital paint systems are characterized in the article as computer graphics devices. For example, the Gravitronics GDS system described on page AX204941 of Exhibit 10, offered picture resolutions of up to 1280 x 1024 pixels. Similarly, the Interand Telestrator Electronic Graphics System described on that page offered display resolutions of up to 4096 x 1600 pixels (Exh. 10, AX204941).

59. Thus one of ordinary skill in the art would have recognized that the term "video" (see, for example, Exh. 10, AX204939-40) was used prior to 1983 to describe display terminals that offered much higher-than-NTSC or PAL resolutions.

60. Indeed, a person of ordinary skill in the art would have understood, as of 1983, that "video" was not limited to any specific set of number of pixels per line or number of lines per frame.

61. Attached as **Exhibit 11** (AX205686) is a summary of a product announcement made on March 29, 1982, by Axiom.

62. The product announced was an EX855 Video Printer. The EX855 Video Printer produced hard copy from computer terminals, graphics terminals, and video monitors. The product announcement indicates that the printer copied the composite video information displayed on the screen on electrosensitive paper. Again, the term "video" is linked to computer terminals and computer graphics, as in a number of the references above.

63. Further, Kodak and Altek's apparent requirement that "video" be associated with a series of related images representing a moving image is inconsistent with the understanding of a person of ordinary skill.

64. As stated above, the computer systems/computer graphics industry used the term "video" to apply to images generated on, for example, computer terminals. For example, the IBM PC July 1982 Reference Manual defined "video" as "Computer data shown or displayed on a cathode ray tube monitor or display" (Exh. 6, AX104122). Such images could be, and often were, static images, stored in memory as an array of a number of lines of pixels, possibly unchanging for seconds or minutes at a time. Persons of ordinary skill in 1983 were well aware of this.

65. I note that the '121 patent states that the "video input circuit 12 may be another electronic still store system, a TV camera, or some other source of video

data from which one or more frames of video image may be captured." ('121 patent, column 2, line 65 through column 3, line 1).

66. A person of ordinary skill in the art would understand from this that, if another electronic still store was used as the video input, that would likely be providing a single still video image (see also '121 patent, column 4, lines 41-44). Such a person would further understand that the reference to "some other source" could be, for example, a data output from one of the computer graphics systems mentioned above. Such a person would understand that the patent, by saying "one or more," allowed for just one image to be input from a particular source.

67. Moreover, I note that the EPO Yamamoto reference (Exh. 3) cited by the '121 Examiner uses the term "video" to refer to images input into the system via a scanner. Specifically, the Yamamoto reference refers to picture information photoelectrically converted by a two-dimension scanning device as a "video signal" (Exh. 3, AX098028 at lines 23-29).

68. Moreover, a person of ordinary skill in the art would understand "video image," as that term is used in the '121 claims, to broadly encompass such electronic signal representations of visual information as user-drawn images when stored in a computer system or communicated across a computer network (see, e.g., Exh. 10). One of ordinary skill in the art would have considered it perfectly appropriate to store such an image in a still store device.

B. "Said Data"

69. The term "said video pixel data" appears in claim 7, the term "the video pixel data" appears in claims 8 and 14, the term "the video data" appears in claim

10, the term "said full size image data sets" appears in claim 12, and the term "the data sets of the plurality of full size images" appears in claims 13 and 15.

70. I understand that Ampex proposes the following definition for these limitations:

> "Said video pixel data" (claim 7); "the video pixel data" (claims 8, 14); "the video data" (claim 10); "said image data sets" (claim 12); and "the data sets" (claims 13, 15), mean data (or data sets) representing the same image as the antecedent data (or data sets).

71. In my opinion, this construction is consistent with what a person of ordinary skill in the art of the '121 patent would understand these terms to mean, as of April 8, 1983.

72. In addition to my direct knowledge of the art of the '121 patent in 1983, the '121 patent specification and additional contemporaneous documents support my view.

73. When we worked with video image data at Aydin Controls, we routinely represented a video image in more than one format depending upon which portion of the display generation system was involved. For example, color information could be coded in multiple ways with the image possibly enhanced, but not considered to have been changed. Moreover, we understood that the pixel-by-pixel layout of a video image in a frame store would likely be different than the precise manner in which the video pixel data for the image would be stored on a disk. Again, we did not consider the image to have changed.

74. The preferred embodiment of the '121 patent would be understood by one of ordinary skill in the art to involve both a form of image compression and different image storage formats for the frame store and for the disk.

75. The form of image compression is subsampling of chrominance data described in column 3, lines 19 through 29. The patent expressly teaches that the chrominance data has half the spatial resolution of the luminance data in the horizontal dimension: in other words, chrominance data is only captured for every other pixel.

76. With regard to different image storage formats, a person of ordinary skill in the art of the '121 patent would understand that the bulk memory of the preferred embodiment, described in column 3, lines 48-52 as a magnetic disk drive, would necessarily store video pixel data for a video image in a different format than would be used in the frame store.

77. I have investigated the details of magnetic disk drive storage formats in the 1983 time frame including those used on Winchester disks that were subsystems of Ampex's ESS-3 electronic still store. The Ampex Capricorn 330 disk drive, for example, used run length limited (RLL) encoding for the storage of video pixel data, as documented in two documents that I found.

78. Attached as **Exhibit 12** (AX204946-53) is a webpage describing the history of disks used with Digital Equipment Corporation (DEC) computers.

79. The document provides, on pages 5 and 6, information that the Ampex Capricorn 330 Winchester disk drive used the SMD interface (Exh. 12, AX204950-51).

80. Attached as **Exhibit 13** (AX204954-73) is a document that provides a historical technology discussion of hard disks.

81. On page 2, the exhibit indicates that the SMD hard disk interface used RLL encoding (Exh. 13, AX204955).

82. Attached as **Exhibit 14** (AX210465-67) is yet another document I found on the Internet.

83. This document contains a description of RLL encoding. This document demonstrates, on page 3, how that encoding reduces the amount of disk space required for the same data bits compared to earlier encoding techniques (Exh. 14, AX210467).

84. Attached as **Exhibit 15** (AXD024625) is a document that describes the use in 1979 on the IBM 3370 disk drive of RLL coding.

85. Attached as **Exhibit 16** (AXD024626-38) is a copy of a 1981 article entitled "A Quarter Century of Disk File Innovation" discussing RLL techniques.

86. These documents further demonstrate that one of ordinary skill in the art of the '121 patent would have understood, from the preferred embodiment of the '121 patent, that different storage formats would be used for video pixel data in the frame store and on the disk.

87. A person of ordinary skill in the art of the '121 patent would have considered this to be important for two reasons. First, the overall reliability of the storage of the image would be statistically improved. Perhaps more importantly, the amount of time it would take to retrieve the image from the disk would be decreased. Given that disk latencies were a primary factor in improving the performance of image stores, reduction in the amount of disk space required to store video pixel data would be an important consideration to a person of ordinary skill.

88. I understand that Kodak and Altek have proposed the following definition for "said data" and similar terms:

> the data that is first referenced in the claims, for example, the data in the random access memory, the data in the first store, the data supplied by an external source, or the data sets provided at a first resolution. This "said video pixel data" is the same data used to generate a reduced size image.

89. I agree that the antecedent to "said data" and similar terms is as stated, and that data for the full size image is used to generate data for the reduced size image. But to the extent such a construction would limit "said data" to the same exact mathematical representation of an image, I do not think that is consistent with how a person of ordinary skill in the art would have understood the terms used in the '121 patent in 1983.

90. A person of ordinary skill in the art of the '121 patent in 1983 would not speak of image enhancements as having produced a new image, but rather an enhanced representation of the same image. Moreover, such a person of ordinary skill would not expect bulk memory storage formats to be identical to those used in RAM. Finally, a person of ordinary skill in the art would not view image compression as having created a new image, as opposed to a compressed representation of the original image, unless the degree of compression was so high that decompression of the compressed representation yielded more than insubstantial differences from the original image.

91. I note that claim 5 of the EPO Yamamoto reference (Exh. 3), which was cited by the '121 patent Examiner, recites that "a compandor (23) is further provided for performing compression and expansion of the picture information by modified Hoffman conversion or modified Hoffman inverse conversion" (Exh. 3, AX098044 at lines 21-26).

92. This passage further confirms my opinion that a person of ordinary skill in the art of the '121 patent in 1983 would understand that video pixel data may be processed (such as by compression) but may still be "said data."

C. "Direct"; "Directly"

93. In the '121 patent claims, claim 7 requires the "direct transfer" of image data from bulk memory to random access memory; claim 8 requires the size reducer to "directly receiv[e]" full size image data from the random access memory, and to supply the reduced size image "directly back" to the random access memory; claim 8 further requires transfer of image data "directly" from bulk storage memory into random access memory; and claim 10 requires transfer of video data from the second store (the bulk memory) "directly" to the first store (the random access memory).

94. I understand that Ampex proposes the following definition for these limitations:

> "Direct" (claim 7) and "directly" (claims 8, 10) mean that the transfer path is not circuitous or roundabout, and that the transferred data is not significantly processed after it has left the providing or sending structure and before it has reached the receiving structure.

95. This construction is consistent, in my opinion, with what a person of ordinary skill in the art of the '121 patent would understand the term "direct" and "directly" to mean, as of April 8, 1983.

96. My opinion is based on my direct knowledge of the art of the '121 patent in 1983, on the prosecution history of the '121 patent, and on the embodiments disclosed in the '121 patent.

97. One of ordinary skill in the art would recognize that a transfer of data between a bulk memory and a random access memory that was "direct" would likely be done with buffering and might be done either through the central processing unit or using direct memory access (DMA) techniques. Buffering would almost certainly be necessary because the transfer speed of the disk would be expected to be quite different than the rate at which the random access memory could accept data. Furthermore, the width, in bits, of the per-cycle output of the disk and the per-cycle input of the RAM would likely be different. Moreover, one or more computer buses (or data highway(s)) would be expected to couple the disk to the RAM. This bus would likely have a speed and bus width that would be different than the operating speeds and port bandwidths of the disk and the RAM.

98. One of ordinary skill in the art would further recognize that a transfer of data is not "direct" if the data itself is altered during the transfer.

99. In addition, the embodiments disclosed in the '121 patent provide further support for my opinion. The sole Figure of the patent would be understood by a person of ordinary skill in the art to disclose at least two potential direct paths between the disk and the RAM of the frame store.

100. First, a DMA transfer path controlled by the CPU and involving the expected buffering would be in conformance with the Figure. Such a DMA transfer path might or might not use bus 20 for data transfer. The disclosed embodiment of CPU 16 in the Figure is a Zilog Z80 8-bit microprocessor. In 1983, the Z80 family of electronic components included DMA peripherals which buffered data in those peripherals as the data was being transferred. Such peripherals are described in Zilog

documents and would be one design choice for handling a DMA-type transfer between the disk store and frame store of the Figure.

101. Second, a transfer path buffering data through CPU registers and using bus 20 for data transfer would be a design alternative, presuming that system performance parameters could be met.

102. Attached as **Exhibit 17** (AX205541-56) is a copy of a Zilog Z80-DMA/Z80A-DMA Preliminary Product Specification, dated October 1977.

103. Page 4 of this document describes "latching," which is in this context a form of buffering (Exh. 17, AX205544).

104. Attached as **Exhibit 18** (AX205563-87) is a copy of a February 1980 Zilog Microcomputer Components Data Book.

105. "Latching" in the context of a DMA transfer is described, for example, on pages 1-60 and 1-61 of this reference (Exh. 18, AX205580-81).

106. Both the use of Direct Memory Access (DMA) and the use of block transfers of data to/from memory under the detailed control of a system's CPU were well known, standard design choices in 1983.

107. The prosecution history of the '121 patent further supports my view of what a person of ordinary skill in the art of the '121 patent would understand the "directly" limitations to mean.

108. In Paper 30 of the prosecution history of the '121 patent, the "directly" limitations and further limitations were added to the claims being prosecuted to distinguish those claims over a prior art patent to Taylor. The system of the Taylor patent had a size reducer interposed between the bulk store and frame store, and the amended

pending claims were distinguished over the Taylor reference in part because the system of the '121 patent does not have such structure. Thus, the "directly" limitations must be understood in the context of not including a size reducer in the transfer paths from the frame store to the disk store and from the disk store to the frame store.

109. I further note that Paper 30 includes a statement to the effect that direct transfers from the bulk memory to the RAM are made "with no other circuit therebetween."

110. A person of ordinary skill in the art would know that the phrase "with no other circuit therebetween" could not literally be true as a technical matter and that neither the preferred embodiment of the '121 patent nor systems with which that person had worked could literally meet this phrase. Since a person of ordinary skill in the art would understand that any such transfer would necessarily have ***some*** circuitry between the bulk memory and the RAM, the clause "with no other circuit therebetween" would, therefore, need to be interpreted within the context of the differentiation over Taylor being made in the Remarks within which the clause was contained.

111. I understand that Kodak and Altek have proposed the following definition for the "direct" and "directly" limitations: "the transfer of data without intervening circuitry."

112. In my opinion, Kodak and Altek's proposed construction is not consistent with how a person of ordinary skill in the art of the '121 patent in 1983 would understand the term "direct," as I explained above concerning the statement in the '121 prosecution history, which includes the phrase "with no other circuit therebetween." Specifically, one of ordinary skill in the art would understand that at least buffering was

likely involved in the transfers between the disk store and frame store in the Figure of the '121 patent.

D. "Selectively generating"

113. The term "selectively generating" appears in Claim 7.

114. I understand that Ampex proposes the following construction for the term "selectively generating":

> "Selectively generating" (claim 7, element 3) means that, without the operator orchestrating each step, the claimed means automatically determines whether to generate a reduced size version and generates it in those cases.

115. A person of ordinary skill, reading the claim in light of the '121 specification and prosecution history, would understand that generation of reduced size images is automatically performed by the claimed system, with that generation being selectively performed as a function of system context. Three such contexts expressly disclosed in the '121 patent are: (1) capturing a full size image from the video input circuit of the Figure of the '121 patent; (2) reading a full size image off of a disk that had not been obtained from a system embodying the asserted claims of the '121 patent; and (3) reading a full size image off of a disk which had been obtained from a system embodying the asserted claims of the '121 patent.

116. In the first context, for every full size image captured by the system of the preferred embodiment, the system would automatically generate a corresponding reduced size image, and both would be stored. Indeed, the '121 patent states that the editing or browsing mode "is useful when scanning all of the images stored by disk store 24" ('121 patent, column 4, lines 52 through 54). This statement would

only be consistent with a reduced size image being generated by the system each time a full size image is captured.

117. In the second system context, the '121 patent, at column 4, lines 7-15, refers to an additional embodiment of the patent, where, if a particular full size image stored on disk does not have a corresponding reduced size image associated with it, then, when that full size image is transferred back to the frame store, the system will automatically generate the reduced size image, thus "fixing" this absence of a corresponding reduced size image. Claim 6 of the '121 patent, which is not asserted in this case, specifically required this optional feature. The other claims do not require it.

118. The '121 specification explains that the bulk store can be a magnetic disk drive store or any other bulk storage memory device ('121 patent, column 3, lines 49-52). As would have been well known to persons of ordinary skill in the art, in 1983 it was common to use removable bulk storage media in connection with such devices as still stores, so that alternative libraries of images or other data could be swapped between machines or work sites. Therefore, the optional mode, described in column 4 and claimed in claim 6, would automatically update a disk containing images obtained from devices not embodying the asserted claims of the '121 patent.

119. In the third system context (reading a full size image off of a disk which had been obtained from a system embodying the asserted claims of the '121 patent), the '121 patent teaches that the system automatically determines not to generate a reduced size image, as such generation has already taken place (see, e.g., '121 patent, column 4, lines 7-12).

E. "Input Port"; "Output Port"

120. The terms "input port" and "output port" appear in claims 8 and 14.

121. I understand that Ampex proposes the following constructions for these terms:

> "Port" (claims 8, 14) means an interface between a communications channel and a unit of computer hardware.
>
> "Input port" (claims 8, 14) means a port for inputting data into the claimed random access memory.
>
> "Output port" (claims 8, 14) means a port for outputting data from the claimed random access memory.

122. These constructions are consistent, in my opinion, with what a person of ordinary skill in the art of the '121 patent would understand the terms "input port" and "output port" to mean, as of April 8, 1983. My view is based upon my direct knowledge from my work in the field of the '121 patent prior to April 8, 1983.

123. I understand that Kodak and Altek have proposed the following construction:

> Random access memory with "an input port and an output port" has an input port and a separate output port.

124. To the extent that this construction would require that the claimed random access memory have physically separate pins for each of the claimed input port and output port (i.e., the random access memory would be "dual-ported" to support simultaneous reading from and writing to the memory, which in this context means reading from and writing to the memory in the same computer clock cycle), in my opinion, the construction is not consistent with what a person of ordinary skill in the art of the '121 patent would understand these limitations to require.

125. "Dual-ported RAM" had a specialized meaning in the early 1980s. Although a person of ordinary skill in the art would understand that dual-ported RAM could be used to implement a random access memory as recited in claim 8, the express language of the claim element does not require such a memory (e.g., the term "output port" is not used in either claim 8 or 14 after being initially recited). Indeed, the claim could have recited a "dual-ported" memory were such a specific limitation intended.

F. "Accessing . . . Simultaneously"

126. The term "simultaneously" appears in claims 13 and 15. In both those claims, the term "simultaneously" is used in the context of accessing particular data from storage locations.

127. I understand that Ampex proposes the following definition of the term "accessing … simultaneously" in claims 13 and 15:

> 'Accessing…simultaneously' means accessing multiple items at the same time, i.e., as a set as part of a single operation.

128. This construction is consistent, in my opinion, with what a person of ordinary skill in the art of the '121 patent would understand this term to mean, as of April 8, 1983.

129. In addition to my direct knowledge of the art of the '121 patent in 1983, the '121 patent specification and additional contemporaneous documents support my view.

130. In computer systems, the term "simultaneously" can be applied at several levels. In its most literal sense, it means that more than one thing is happening within the same system clock cycle. However, the term is more generally applied at the level of multiple things happening within a single system operation. It is this latter sense

of "simultaneously" that the term is used in claims 13 and 15 of the '121 patent to refer to accessing all of a set of reduced size reproduction images as one operation.

131. In column 4, lines 45 to 63, the '121 patent describes the editing or browsing mode of operation of the preferred embodiment. The patent makes it clear that the accessing of 16 reduced size images is done as a single operation, as it expressly discusses how "[t]he 16 image assembly time is greatly reduced...This is only one-sixteenth of the time that would conventionally be required" (column 4, lines 58-63). The "conventional" mode of operation discussed in this passage would be that of "on-the-fly" generation of reduced size images from full size images stored on disk.

132. The prosecution history demonstrates that Ampex intended this meaning of "accessing . . . simultaneously" in its prosecution of the claims. In particular, in Paper 30 of the '121 prosecution history, at page 8, Ampex explained that claim 29, which issued as claim 13, was amended to:

> . . . clarify[] that the accessing is done to one of the . . . full size images, or to the reduced size reproduction images in a set simultaneously.

133. The wording of claims 13 and 15 as issued was then finalized by an Examiner Amendment. However, when informed that an Examiner's Amendment is used to clarify and correct minor errors, not to fundamentally alter the meaning or scope of a claim, a person of ordinary skill in the art would be able to understand, irrespective of the particular phrasing in claims 13 and 15, that the claimed system would need to have the capability of both accessing a full size image and also of accessing a plurality of reduced size images simultaneously, as in the preferred embodiment disclosed in the '121 patent.

134. I understand that Kodak and Altek have proposed the following construction:

> "Selectively" accessing one of the full size images and one of the reduced size images "simultaneously" means that there is the ability to choose (i.e., select) any one of the full size images and any one of the reduced size images and access both at the same time.

135. Thus, Kodak and Altek construe this language as requiring that the output of the full and reduced size images must occur at the same time. This construction not only is inconsistent with my view of what a person of ordinary skill in the art of the '121 patent would understand "accessing…simultaneously" to mean, but also implies that claims 13 and 15 would not cover any disclosed embodiment of the '121 patent.

G. Means-plus-function analysis

136. I have been informed that certain of the elements of the asserted claims of the '121 patent are means-plus-function claim elements pursuant to 35 U.S.C. § 112 ¶ 6.

137. I have been asked to identify the function(s) each of these elements performs and to identify the corresponding structure(s) that performs that function(s).

1. Claim 7, Third Element

138. The third element of claim 7 reads:

> means responsive to said random access memory means for selectively generating one of said corresponding reduced size versions from the respective full size image in said random access memory means, and for transferring the video pixel data representing the corresponding reduced size version back to the contents of said random access memory means.

139. In my opinion, a person of ordinary skill in the art of the '121 patent would understand that this element performs the functions of "selectively

generating one of said corresponding reduced size versions from the respective full size image in said random access memory means", and "transferring the video pixel data representing the corresponding reduced size version back to the contents of said random access memory means."

140. In my opinion, a person of ordinary skill in the art of the '121 patent would understand that the structures in the '121 patent specification that perform these claimed functions are the size reducer 26 and CPU 16.

141. I understand that Kodak and Altek have stated that the '121 patent did not disclose any structure for performing the claimed functions of this third element of claim 7.

142. In my opinion, size reducer 26 was sufficiently described in the patent.

143. References to a "size reducer" and image size reduction in the '121 patent are found at the Figure, "Size Reducer 26;" column 1, lines 27-40, 44-54; column 2, lines 11-24; column 3, lines 1-3, 20-34, 58-65; and column 4, lines 1-15. In the context in which the term "size reducer" is used in the '121 patent, persons of ordinary skill in 1983 recognized that term as denoting well-known structures that perform the function of reducing the size of an image.

144. The specification specifically and expressly describes the details of the input to, and output from, the size reducer. The control and data couplings for size reducer 26 are depicted diagrammatically in the Figure of the patent and are discussed in column 4, lines 1-7, in a manner that supports the recitations of the asserted claims. While the internals of box 26 in the Figure are not disclosed, they did not need to be

disclosed. In my experience, a person of ordinary skill in the art of the '121 patent would readily know of a number of routine design choices to implement the claimed size reducer. Specifically, it was well-known and a routine design choice for someone of ordinary skill in the art of the '121 patent to reduce the size of a video image using either decimation/subsampling or some form of interpolation.

145. Attached as **Exhibit 19** (EKC000142660-85) is a copy of U.S. Patent No. 4,302,776 ("the '776 patent"), which was identified and described in the Background of the Invention section of the '121 patent at column 1, lines 50-61.

146. The '776 patent discloses to a person of ordinary skill in the art one such routine design choice to implement a size reducer. Specifically, the '776 patent discloses a size reducer (size change processor 23) which includes a decoder, a number of separate horizontal and vertical interpolators, and an interpolator clock generator and which uses subsampling and/or interpolation to generate reduced-size images. (Exh. 19 at, e.g., Figure 5; column 5, lines 10-37; column 7, lines 10-53).

147. Attached as **Exhibit 20** (AX060416-23) is a copy of U.S. Patent No. 4,172,264 ("the '264 patent"), which was identified and described in the Background of the Invention section of the '121 patent at column 1, lines 44-49.

148. The '264 patent discloses a size reducer that uses decimation to generate reduced-size images (Exh. 20, column 2, lines 12-16).

149. Attached as **Exhibit 21** (AX200036-65) is a copy of Alvy Ray Smith, "Digital Filtering Tutorial for Computer Graphics, Technical Memo No. 27," dated March 3, 1983, as apparently included on pp. 244-72 of a publication associated with the 1983 SIGGRAPH conference.

150. Attached as **Exhibit 22** (AX099894-904) is a copy of U.S. Patent No. 4,258,385.

151. Exhibits 21 and 22 offer other examples of size reducers/size reduction techniques known in the art prior to the '121 patent (*see, e.g.*, Exh. 22, column 10, lines 51-59).

152. Attached as **Exhibit 23** (AX031664-70, AX031873-99) are excerpts from a copy of the prosecution history of the European counterpart of the '121 patent before the European Patent Office.

153. During the prosecution of the European counterpart of the '121 patent, the European Patent Office confirmed that size reducers were well-known in the art prior to the '121 patent, and that they could be implemented with nothing more than "common general knowledge." In granting Ampex's appeal setting aside the written decision of the EPO Examining Division, the Technical Board of Appeal of the EPO stated in discussing the size reducer of claim 1:

> [I]f necessary features, essential to the invention, were missing from claim 1 and these features could not be found in the description, an objection that the claimed invention was not disclosed in the application (as a whole) in a manner sufficiently clear and complete for it to be carried out by a skilled person would be justified.
>
> It is noted, however, that the Examining Division did not raise such an objection under Article 83 EPC.
>
> Nor does the Board see any reason for raising such an objection, considering that a skilled addressee would be able to implement said stores and size reducer, and their interconnections, without having to rely on information going beyond common general knowledge.

(Exh. 23, AX031884-85).

154. My opinion is further confirmed by the prosecution history of U.S. Patent No. 4,802,019 to Harada, where the Examiner in the parent application, which was

filed on January 3, 1983, stated that "applicant's description of the 'squeezer' circuit as an ordinary picture reduction circuit is satisfactory" (Beamer Decl.[1] Exh. 4, AX203836). The "squeezer" circuit was disclosed in the parent application as performing picture size reduction, and the above quotation from the prosecution history of the parent application was in response to the applicant rebutting the Examiner's contention that the parent application did not provide appropriate written description/enablement of the "squeezer." Moreover, at his deposition in this case, Mr. Harada confirmed that a size reducer was "easy to make around this time period" (Beamer Decl. Exh. 6, Harada 2/17/2006 Tr. at 66:1-6).

155. Finally, my opinion concerning the sufficiency of the disclosure of size reducer 26 is confirmed by the allowance of the claims of the '121 patent by the USPTO.

2. Claim 10, Fourth Element

156. The fourth element of Claim 10 reads:

> means for selectively transferring from said second store directly to said first store either video data representing of the plurality of video images corresponding to the selected raster size, or video data representing a plurality of reproductions at the selected fractional-size of said selected raster size.

157. In my opinion, a person of ordinary skill in the art of the '121 patent would understand that the function performed by this element is "selectively transferring from said second store directly to said first store either video data representing [one] of the plurality of video images corresponding to the selected raster

[1] "Beamer Decl." refers to the Declaration of Norman H. Beamer in Support of Ampex Corporation's Motion for Summary Judgment that U.S. Patent 4,802,019 Is Not Prior Art to U.S. Patent No. 4,821,121.

size, or video data representing a plurality of reproductions at the selected fractional-size of said selected raster size."

158. In my opinion, a person of ordinary skill in the art of the '121 patent would understand that the structure disclosed in the '121 patent specification for performing the claimed function is CPU 16.

3. Claim 12, Eighth Element

159. The eighth element of Claim 12 reads:

> means responsive to said memory for displaying the output image as a raster scanned video display.

160. In my opinion, a person of ordinary skill in the art of the '121 patent would understand that the function performed by this element is "displaying the output image as a raster scanned video display."

161. In my opinion, a person of ordinary skill in the art of the '121 patent would understand that the structure disclosed in the '121 patent specification for performing the claimed function is monitor 30.

I declare under penalty of perjury that the foregoing is true and correct. Executed this 17th day of May, 2006, at Washington, DC.

George T. Ligler

CERTIFICATE OF SERVICE

I, Julia Heaney, hereby certify that on May 23, 2006, I caused to be electronically filed the foregoing with the Clerk of the Court using CM/ECF, which will send notification of such filing(s) to the following:

Paul M. Lukoff, Esquire
David E. Brand, Esquire
Prickett, Jones & Elliott, P.A.

and that I caused copies to be served upon the following in the manner indicated:

BY E-MAIL on 5/23/06 and
BY HAND on 5/24/06

Paul M. Lukoff, Esquire
Prickett, Jones, Elliott, P.A.
1310 King Street
Wilmington, DE 19899

BY E-MAIL on 5/23/06 and
BY FEDERAL EXPRESS on 5/24/06

Michael J. Summersgill, Esquire
Wilmer Cutler Pickering Hale and Dorr LLP
60 State Street
Boston, MA 02109

/s/ Julia Heaney
Julia Heaney (#3052)